Réparations et recherche: une nécessité

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Nouvelle norme EN 1504
FEREB
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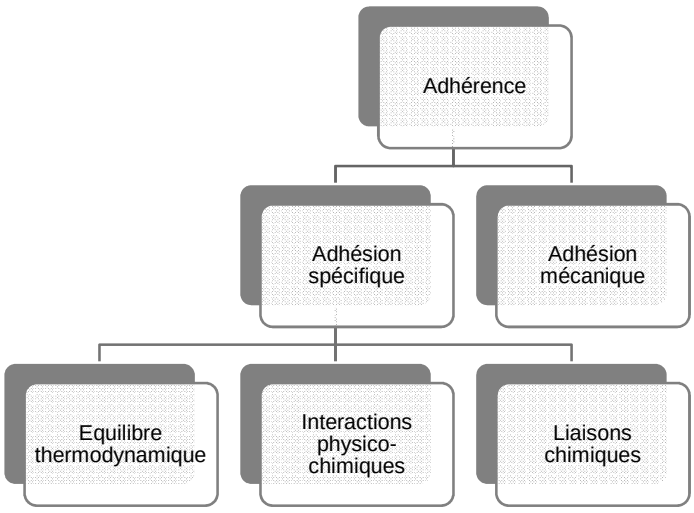
Le sort des nations qui négligent la science et les savants est marque de la décadence

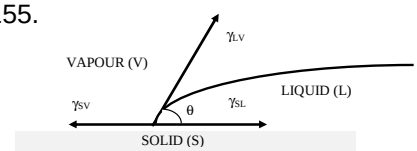
Albert 1er, 1927 (Discours de Seraing)

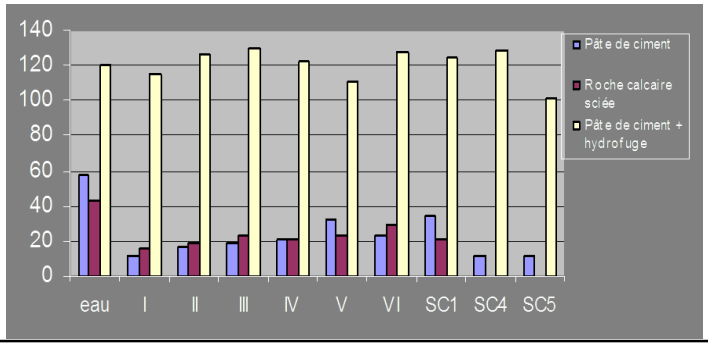
Thématiques de recherche



Compatibilité des produits

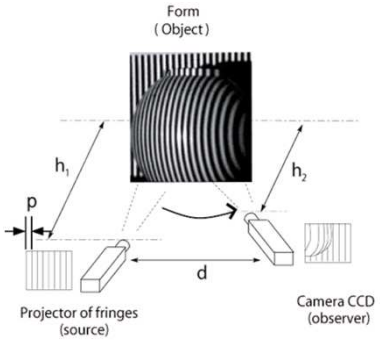
- Evaluation of thermodynamic properties of concrete substrates and cement slurries modified with admixtures. L. Courard. Mater. Struct., **35** (April 2002) 149-155.

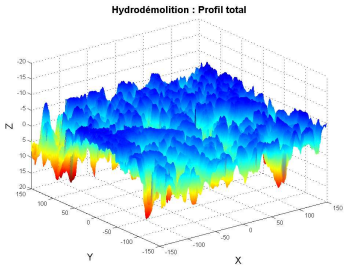




Evaluation de la rugosité

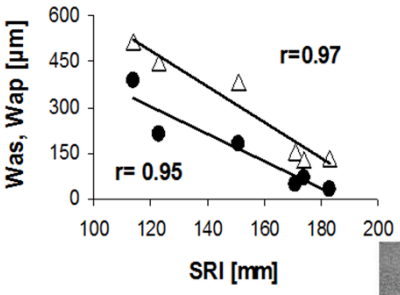
- Concrete surface roughness characterization by means of opto-morphology technique. L. Courard, D. Schwall and T. Piotrowski. Monography: Adhesion in Interfaces of Building Materials: a Multi-Scale Approach (AMSR Advances in Material Science and Restoration, Eds. L. Czarnecki and A. Garbacz, Aedificio Publishers) (2007) 107-116.





Comparaison des méthodes d'évaluation de la rugosité

- Topography evaluation methods for concrete substrates: parametric study. L. Courard, A. Garbacz and B. Bissonnette. ICCRRR12 International Congress on Concrete Repair, Reinforcement and Retrofitting, (Alexander et al (eds), 2012 Taylor & Francis Group, London), Cape Town (2012), pp379.

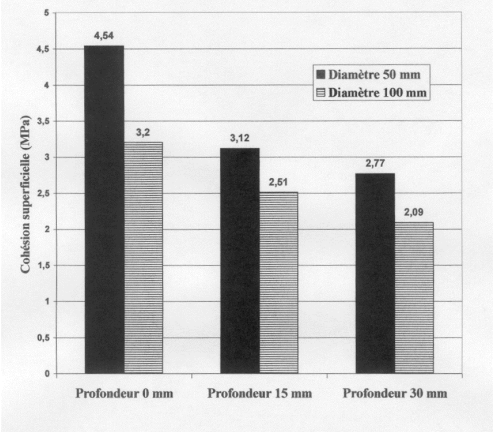


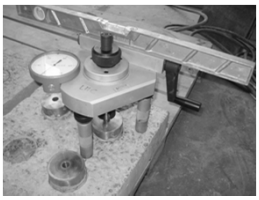
Surface Rough Index vs arithmetic mean of waviness for mechanical (p,Δ) and laser (s,•) profilometers

ASTM E965
EN 13036-1: 2002
EN 1766: 2000

Mesure de la cohésion superficielle

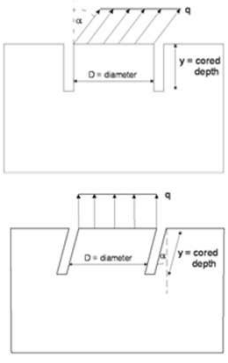
- Essai dérivé de l'essai d'adhérence pour la caractérisation de la cohésion superficielle des supports en béton dans les travaux de réparation : analyse des paramètres d'essai. L. Courard et B. Bissonnette. Mater. Struct., **37**(269) (2004) 342-350.





Eccentricité du pull-off test

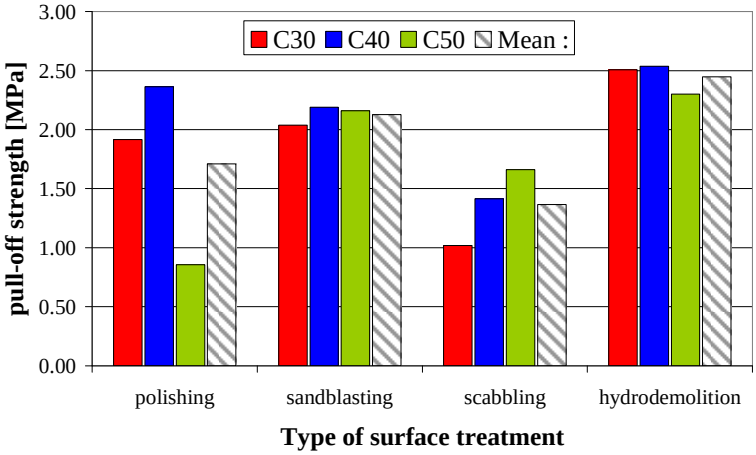
- Evaluation of the effect of load eccentricity on pull-off strength . G. Moczulski, A. Garbacz and L. Courard. ICCRRR08 International Congress on Concrete Repair, Reinforcement and Retrofitting, *(Alexander et al (eds), 2009 Taylor & Francis Group, London),* Cape Town (2008) 1017-22.



Concrete type	Percentage of variation of pull-off strength vs reference (%)			
	Core depth 15mm (0.59 in.)		Core depth 30mm (1.18 in.)	
	2°	4°	2°	4°
C30/37	8	5	6	6
C40/50	8	10	3	-6
C50/60	3	13	6	12

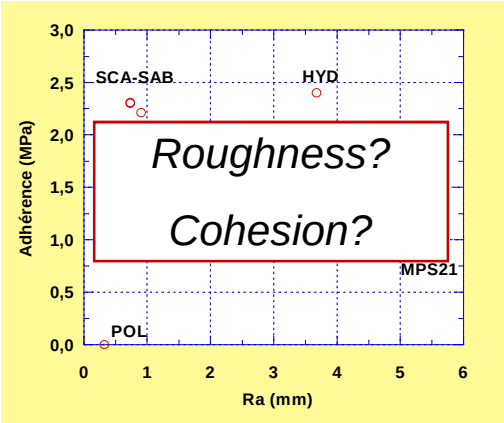
Effets de la rugosité sur l'adhérence

- Effect of concrete surface treatment on adhesion in repair systems, A. Garbacz, M. Gorka and L. Courard. Mag. Concrete Res., **57**(1) (2005) 49-60.



Technique de préparation de surface

- Concrete removal techniques: influence on residual cracking and bond strength. B. Bissonnette, L. Courard, A. Vaysburd and N. Bélair. Concrete International, **28**(12) (2006) 49-55.



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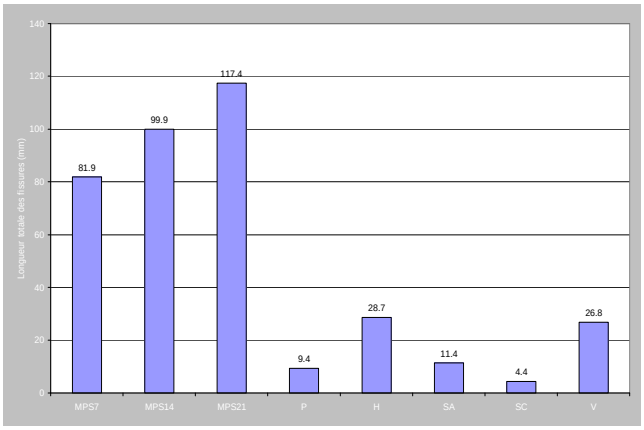
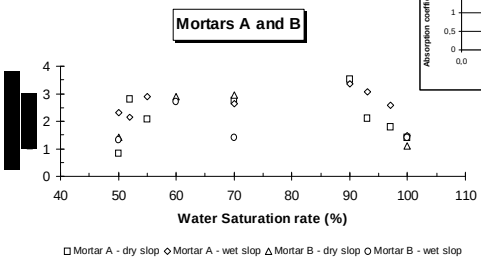
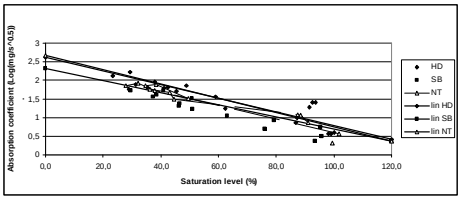


Saturation du support

- Saturation level of the superficial zone of concrete and adhesion of repair systems. L. Courard, J. F. Lenaers, F. Michel and A. Garbacz. Construction and Building Materials **25** (5) (May 2011) 2488-2494.

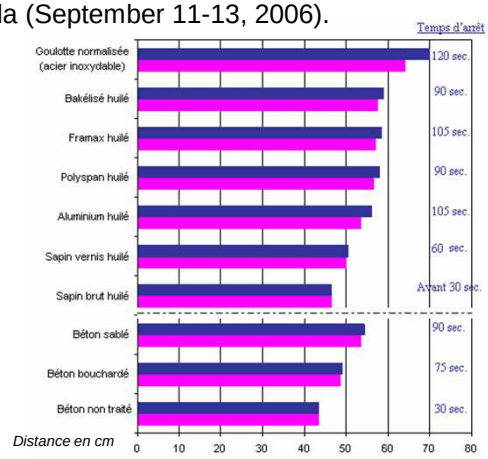




Développement de SCRM

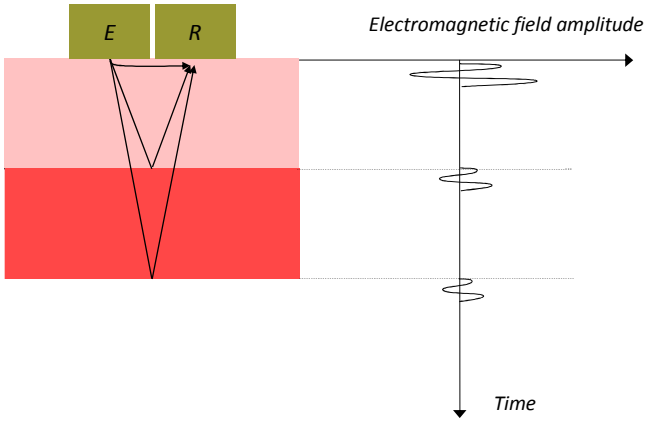
- Design of a Self Compacting Repair Mortar to be applied under concrete slabs and floors. St. Flamant and L. Courard. In: 2nd RILEM Symposium Advances in Concrete through Science and Engineering, Québec, Canada (September 11-13, 2006).

Flow trough test (EN 13395-2)



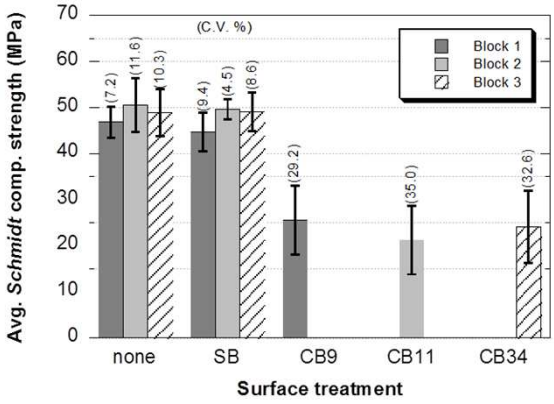
Analyses non destructives

- Static Detection of Thin Layers into Concrete with Ground Penetrating Radar. A. Van der Wielen, L. Courard, F. Nguyen. Restoration of Buildings and Monuments **18** (3/4) (2012) 247–254.



Auscultation et méthodes semi-destructives

- Comparison of destructive methods to appraise the mechanical integrity of a concrete surface. L. Courard, B. Bissonnette, A. Vaysburd, N. Belair and F. Lebeau. Concrete Repair Bulletin 25(4) (July-August 2012) 22-30



SB = sablage
CB9 = marteau-piqueur (9kg)
CB11 = marteau-piqueur (11kg)
CB34 = marteau-piqueur (34kg)

Monuments historiques

- Churches and concrete in Liège district: history, architecture and pathologies. A. Gillard, L. Courard and P. Paquet. Restoration of Buildings and Monuments **17** (1) (2011) 3–14.

Structure en béton armé supportant le dôme, église Saint-Vincent, Liège

Eglise Saint-Vincent, Liège

Eglise Saints Pierre-et-Paul, Liège

Recommandations pour les réparations

- Bonded cement-based material overlays for the repair, the lining or the strengthening of slabs and pavements. B. Bissonnette, L. Courard, D.W. Fowler and J.L. Granju. RILEM STAR Report Volume 3, 193-RLS RILEM TC (Springer, Dordrecht), 2011,175p.